

CLAIMS

What is claimed is:

- 1 1. A computer model of a device, said computer model comprising:
2 a performance parameter,
3 wherein said performance parameter includes a first bounded range and a second
4 bounded range,
5 wherein said first bounded range comprises performance parameter variations within a
6 single manufacturing process, and
7 wherein said second bounded range comprises performance parameter variations of
8 different device designs.
- 1 2. The computer model in claim 1, wherein said different device designs are directed to
2 variations of a single device design.
- 1 3. The computer model in claim 1, wherein said performance parameter is the same for a
2 target model of said device and a final hardware design of said device.
- 1 4. The computer model in claim 1, wherein said performance parameter is constrained
2 within at least one of said first bounded range and said second bounded range.

1 5. The computer model in claim 4, wherein said performance parameter is bounded by
2 both of said first bounded range and said second bounded range.

1 6. The computer model in claim 4, wherein designs of said devices are permitted to vary
2 as long as said performance parameter is maintained within said at least one of said first
3 bounded range and said second bounded range.

1 7. The computer model in claim 1, wherein said performance parameter comprises a
2 plurality of performance points.

1 8. The computer model in claim 1, wherein said performance parameter comprises at least
2 a two-dimensional range of a plurality of performance points.

1 9. A computer-implemented method for designing a device tolerant to variance in a given
2 performance parameter, said method comprising:

3 designing said device using a computer model of said performance parameter,

4 wherein said performance parameter model includes a first bounded range and a second
5 bounded range,

6 wherein said first bounded range comprises performance parameter variations within a
7 single manufacturing process, and

8 wherein said second bounded range comprises performance parameter variations of
9 different device designs.

- 1 10. The method of claim 9, wherein said different device designs are directed to the
2 variations of a single device design.
- 1 11. The method of claim 9, wherein said performance parameter is the same for a target
2 model of said device and a final hardware design of said device.
- 1 12. The method of claim 9, wherein said performance parameter is constrained within at
2 least one of said first bounded range and second bounded range.
- 1 13. The computer model in claim 9, wherein designs of said devices are permitted to vary
2 within said model as long as they remain within said first bounded range and said second
3 bounded range.
- 1 14. A method of developing a product having a device, said method comprising:
2 providing design goals for said device;
3 producing a target model of said device based on said design goals, said target model
4 including a target performance parameter; and
5 designing said device and said product based on said target performance parameters,
6 wherein said target performance parameter comprise a plurality of performance points.

1 15. The method of claim 14, wherein said target performance parameter is constrained to
2 be within a first bounded range and a second bounded range,
3 wherein said first bounded range comprises performance parameter variations within a
4 single manufacturing process, and
5 wherein said second bounded range comprises performance parameter variations of
6 different device designs.

1 16. The method of claim 15, wherein said different device designs are directed to
2 variations of a single device design.

1 17. The method of claim 14, wherein said target performance parameters are the same for a
2 target model of said device and a final hardware design of said device.

1 18. The computer model in claim 15, wherein designs of said devices are permitted to vary
2 as long as said target performance parameters are maintained.

1 19. A method of designing a device comprising:
2 proposing a particular feature for said design;
3 determining primary parameters for said particular feature;
4 determining secondary parameters from said primary parameters; and

5 producing a target model of said particular feature bounded by allowable limits in said
6 primary parameters and said secondary parameters.

1 20. The method of claim 19, wherein said step of determining secondary parameters further
2 comprises the steps of:

3 determining at least one further secondary parameter from said secondary parameters;
4 and
5 correlating said secondary parameters to said at least one further secondary parameter.

1 21. The method of claim 19, further comprising the step of verifying that all primary and
2 secondary parameters are within allowable limits.

1 22. The method of claim 19, wherein said primary parameters comprise first-order primary
2 parameters and second-order primary parameters.

1 23. A method of designing a device, comprising the steps of:
2 determining a set of design distributions that are within a given set of performance
3 targets for a plurality of parameters;
4 altering different features of said design; and
5 determining whether said altered design is within said set of design distributions.

1 24. A method of developing a product having a device, said method comprising:

2 providing design goals for said device;

3 producing a target model of said device based on said design goals, said target model

4 including a plurality of target performance parameter ranges; and

5 simultaneously designing said device and said product based on said target model.

1 25. The method of claim 24, wherein said step of designing said device further comprises:

2 altering a device design to produce an altered device design; and

3 accepting said altered device design only if said altered device design performs within
4 said target performance parameters.

5 26. The method of claim 25, further comprising:

refining said target model based on said altered device design; and

designing at least said product based on said refined target model.

27. The method of claim 25, wherein said step of accepting said altered device design

2 further comprises the steps of carrying out experiments on test chips.

1 28. The method of claim 24, wherein said step of designing said product further comprises:

2 providing design goals for said product; and

3 developing a product model from said target model and from said design goals for said

4 product.

1 29. The method of claim 28, further comprising:
2 simulating said product model;
3 determining whether said design goals for said product have been met; and
4 altering said design of said product if said product design goals have been met.

1 30. The method of claim 24, wherein said accepting process comprises:
2 calculating a primary parameter from a physical device feature;
3 correlating a secondary parameter from said primary parameter; and
4 comparing said secondary parameter to said target performance parameter.

1 31. The method of claim 30, further comprising correlating other secondary parameters
2 from correlations to said secondary parameters.

1 32. The method of claim 30, wherein said primary parameter is directly related to said
2 physical device feature.

1 33. The method of claim 30, wherein said correlating is performed using predetermined
2 primary-to-secondary correlation calculations.

1 34. The method of claim 24, wherein said target performance parameters are the same for a
2 target model of said device and a final hardware design of said device.

1 35. The method of claim 24, wherein device design is permitted to vary as long as said
2 target performance parameters are maintained.

1 36. A computer medium storing a computer model, said model comprising:
2 a performance parameter,
3 wherein said performance parameter includes a first bounded range and a second
4 bounded range,
5 wherein said first bounded range comprises performance parameter variations within a
6 single manufacturing process, and
7 wherein said second bounded range comprises performance parameter variations of
8 different device designs.

1 37. The computer medium in claim 36, wherein said performance parameter is constrained
2 within at least one of said first bounded range and said second bounded range.

1 38. The computer medium in claim 36, wherein said performance parameter comprises a
2 plurality of performance points.

1 39. The computer medium in claim 36, wherein said performance parameter comprises at
2 least a two-dimensional range of a plurality of performance points.

1 40. A computer medium storing a design generated utilizing a computer model, said model
2 comprising:
3 a performance parameter,
4 wherein said performance parameter includes a first bounded range and a second
5 bounded range,
6 wherein said first bounded range comprises performance parameter variations within a
7 single manufacturing process, and
8 wherein said second bounded range comprises performance parameter variations of
9 different device designs.